ELASTOMERIC BEARINGS **(4-18-00)**

Elastomeric bearings may be either "plain" (consisting of elastomer only) or "laminated" (consisting of alternating individual layers of elastomer and non-elastic laminates) as shown on the plans.

Bearing pads are not required with elastomeric bearings.

The elastomer for bearings shall be formulated from previously unvulcanized 100% virgin polychloroprene (neoprene) or 100% virgin natural polyisoprene (natural rubber). All plain bearings shall be either molded individually, cut from previously molded strips or slabs molded to the full thickness of the finished bearings, or extruded and cut to length. The finished bearings shall have no voids or separations. Plain elastomeric bearings shall be well-vulcanized, uniform, integral units of such construction that the bearing is incapable of being separated by any mechanical means into separate, definite, well-defined elastomeric layers. Evidence of such layered construction either at the outer surfaces of the bearing or within the bearing shall be cause for rejection of such bearing shipments.

1079-2(A)

All components of a laminated bearing shall be molded together to form an integral unit free of voids or separations in the elastomer or between the elastomer and the non-elastic laminates. The elastomer between the laminates shall be well-vulcanized, uniform and integral such that it is incapable of being separated by any mechanical means into separate, definite, well-defined elastomeric layers. Evidence of such layered construction, either at the outer surfaces or within the bearing, shall be cause for rejection of such laminated bearing shipments. Non-elastic laminates shall be steel conforming to AASHTO M270 Grade 36, ASTM A570, or an approved steel equivalent. The outer metal laminations shall be 3/16 inch and the inner laminations shall be 14 gage or 12 gage as indicated on the plans. The outer laminations of elastomer shall be 1/4 inch minimum and the inner laminations shall all be of equal thickness as shown on the plans. The edges of all metal laminations shall have a minimum cover of 1/8 inch of elastomer. The top and bottom bearing surfaces shall each have an integral sealing rib a minimum of 1/8 inch in depth (in addition to specified total thickness) and 3/16 inch in width around their peripheries.

The finish of cut surfaces shall be at least as smooth as ANSI #250 finish. The batch or lot number shall be marked on each bearing in such a manner as to remain legible until the acceptability of the bearing has been determined by the State Materials Engineer. A piece-mark shall be marked on each bearing in such a manner as to remain legible until placement in the structure.

Elastomer formulated from neoprene shall meet the requirements shown in Table A. Elastomer formulated from natural rubber shall meet the requirements shown in Table B. Test specimens shall be in accordance with ASTM D15, Part B.

1079-2(B)

Elastomer in all bearings shall have a Grade 50 durometer hardness, unless noted otherwise on the plans.

1079-2(B)

TABLE A		
Grade (durometer)	50	60
PHYSICAL PROPERTIES Hardness ASTM D2240 Tensile strength, minimum psi ASTM D412 Elongation at Break, minimum percent	 50+5 -0 2500 400	 60+5 -0 2500 350
ACCELERATED TEST TO DETERMINE LONG-TERM AGING CHARACTERISTICS OVEN AGED - 70 HRS, AT 212°F ASTM D573 Hardness, points change maximum Tensile strength, % change maximum Elongation at break, % change maximum	 0 to +15 -15 -40	 0 to +15 -15 -40
OZONE: 100 PPHM in air by volume 20% strain at 100 ± 2°F ASTM D1149* 100 Hours	 No Cracks	 No Cracks
COMPRESSION SET 22 Hrs. at 212°F ASTM D395 (Method B) % Maximum	 35	 35
ADHESION ASTM D429, B Bond made during vulcanization, lbs/in	 40	 40
LOW TEMPERATURE RESISTANCE ASTM D746, Procedure B Brittleness at -40°F	 No Failure	 No Failure

* Samples to be solvent wiped before test to remove traces of surface impurities.

TABLE B		
Grade (durometer)	50	60
PHYSICAL PROPERTIES Hardness ASTM D2240 Tensile strength, minimum psi ASTM D412 Elongation at Break, minimum percent	 50+5 -0 2500 450	 60+5 -0 2500 400
ACCELERATED TEST TO DETERMINE LONG-TERM AGING CHARACTERISTICS OVEN AGED - 70 HRS, AT 158°F ASTM D573 Hardness, points change maximum Tensile strength, % change maximum Elongation at break, % change maximum	 0 to +10 -25 -25	 0 to +10 -25 -25
OZONE: 25 PPHM in air by volume 20% strain at 100 ± 2°F. ASTM D1149* 48 Hours	 No Cracks	 No Cracks
COMPRESSION SET 22 Hrs. at 158°F. ASTM D395 (Method B) % Maximum	 25	 25
ADHESION ASTM D429, B Bond made during vulcanization, lbs/in	 40	 40
LOW TEMPERATURE RESISTANCE ASTM D746, Procedure B Brittleness at -40°F	 No Failure	 No Failure
* Samples to be solvent wiped before test to remove traces of surface impurities.		

1079-2(B)

The following criteria shall be met under laboratory testing conditions of full size bearings:

The manufacturer shall proof load each laminated bearing to 150% of the maximum design dead load plus live load shown on the plans. If bulging patterns imply laminate placement that does not satisfy design criteria, or if bulging suggests poor laminate bond, the bearing will be rejected. If there are three separate surface cracks that are greater than 0.08 inches wide and 0.08 inches deep, the bearing will be rejected.

1079-2(B)

The shear resistance of the bearing at 25% strain of the total effective rubber thickness, after an extended four-day ambient temperature of -20°F., shall not exceed 50 psi for 50 durometer or 75°psi for 60 durometer Table A compounds, nor 30 psi for 50 durometer or 40 psi for 60 durometer for Table B compounds.

Flash tolerance, finish and appearance shall meet the requirements of the latest edition of the "Rubber Handbook, Second Edition" as published by the Rubber Manufacturers Association, Inc.: RMA-F3-T.063 for molded bearings and RMA-F2 for extruded bearings.

Permissible variation from the dimensions and configuration required by the plans and these specifications shall be as follows:

- Overall vertical dimensions: - 0, +1/16"
- Overall horizontal dimensions: - 0, +1/4"
- Thickness of individual layers of elastomer (Laminated bearings only): ± 1/16"
- Variations from a plane parallel to the theoretical surface:

  Top 1/8"
  Sides 1/4"

1079-2(C)

- Edge cover of embedded laminates: - 0, +1/8"
- Size of holes or slots: - 0, +1/8"
- Position of holes or slots: - 0, +1/8"
- Thickness of non-elastic laminates: - 0, +1/16"

All bearings furnished by the Contractor shall be produced by a bearing manufacturer who has previously submitted the required pre-qualification test samples and certifications and whose elastomer formulation has been initially approved for use by the State Materials Engineer. Each elastomer formulation produced by a manufacturer must be approved by the State Materials Engineer prior to its first use on Department of Transportation projects. To pre-qualify and obtain initial approval of a particular formulation, the bearing manufacturer shall submit to the State Materials Engineer, well in advance of anticipated use of his product, certified test results showing actual test values obtained when the physical properties of the elastomer to be furnished were tested for compliance with the pertinent specifications.

1079-2(D)

In addition, the manufacturer shall forward pre-qualification test samples to the State Materials Engineer, for testing and evaluation of compliance with pre-qualification requirements. These pre-qualification samples shall consist of at least two finished bearings typical of the formulation and workmanship intended for use on Department of Transportation projects.

The bearing manufacturer shall certify that all of the samples submitted are of the same basic elastomer formulation and of equivalent cure to that used in the finished products to be furnished on Department of Transportation projects.

1079-2(D)

The producer may be required to perform the complete pre-qualification testing procedure again during later production should the State Materials Engineer feel such action appropriate.

After pre-qualification approval, the inspection, sampling and testing of actual bearing production will be as outlined below.

The manufacturer shall furnish certified laboratory test results on the elastomer properties of each batch or lot of compound used in the manufacture of bearings, both plain and laminated. One sample bearing shall be submitted for each batch or lot of compound for verification testing.

Payment for elastomeric bearings will be at the contract lump sum price for "Elastomeric Bearings". This price shall be full compensation for all materials, tools, equipment, labor, and for all incidentals necessary to complete the work.

430-9 & 440-13